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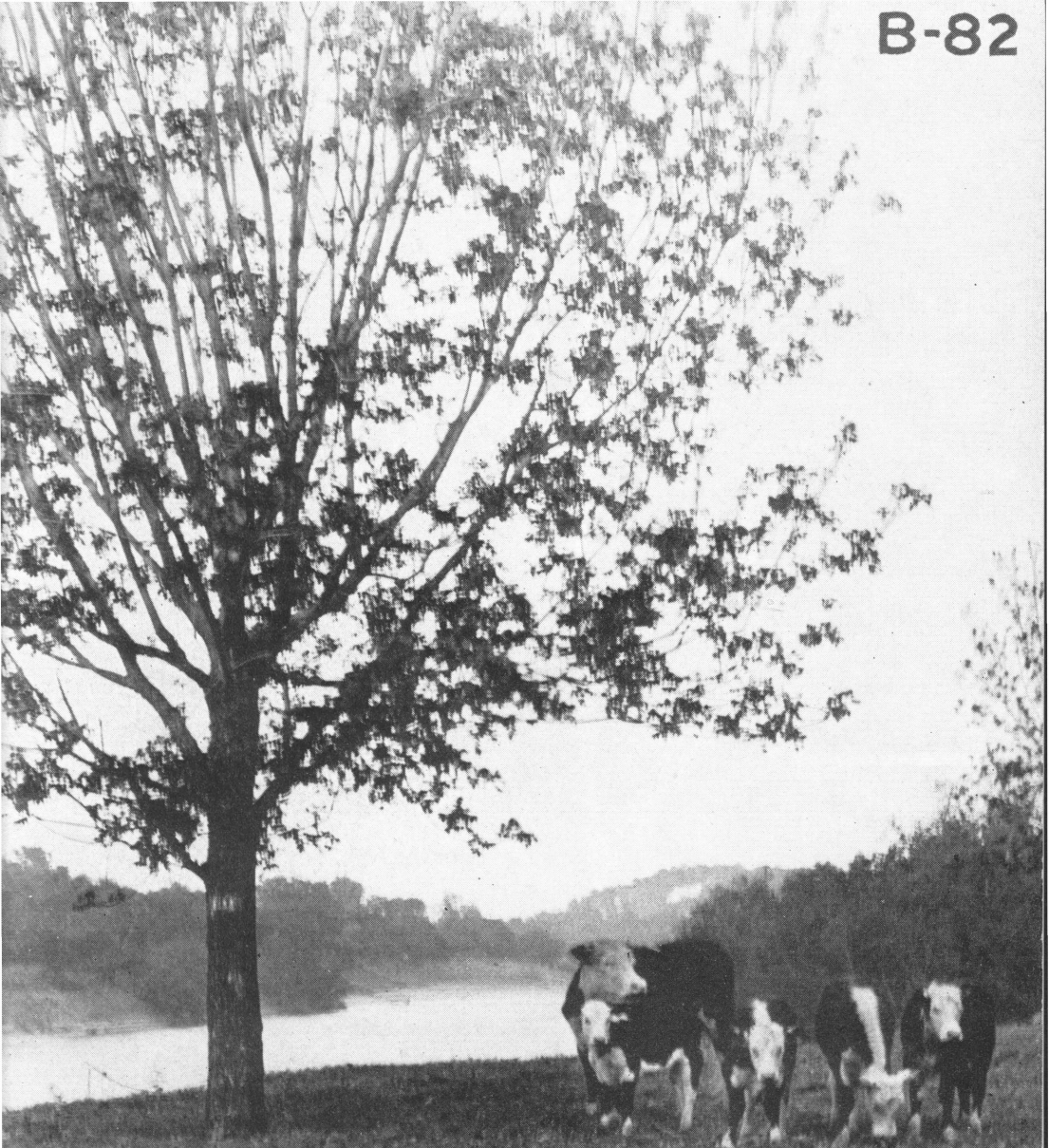

PASTURES

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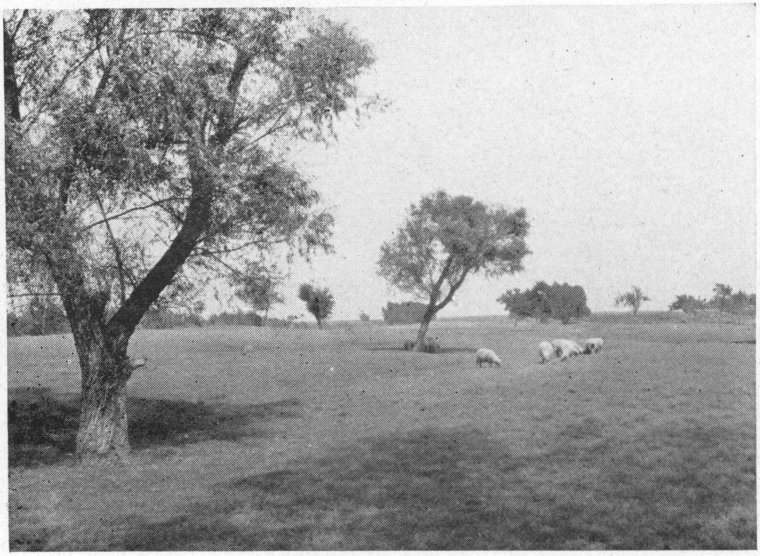


Pastures

R. H. Bush, Special Agent, in Charge of Pastures

A NEW LAND UTILIZATION POLICY is in the making in the United States. The Government seeks to take out of production 43 million acres of crop land. This land must go back to pasture, be reforested or lie idle. There is no better way to hold land from washing and to build it back than to put it in pasture. There is no use to which land may be put that will in general yield as much revenue for a small expenditure of time and money as in pasture. The best way to balance the farm income throughout the year is to have a little livestock on good pasture.

Farmers work hard to produce bumper crops but they take pasture for granted. It is usually the poorest land on the farm, grown to weeds and brush and chiefly valuable as a place for animals to exercise. Many times a little cash and work will make the pasture the most valuable land on the farm.

There is no great mystery to pasture improvement. In general it consists simply of giving native grasses and clovers a chance to grow. Cutting out excess timber and brush, and mowing weeds with a machine or with sheep will give the greatest improvement at the least cost. Terracing or contouring to hold rainfall promotes growth. Enough trees for shade for livestock should be left, and a good supply of water provided. Cross-fences to divide the pasture into two or more parts so it may be rested from grazing at times is suggested. Salamanders and other rodents that destroy grass land should be killed out. Seeding to improve pasture plants should be done where it pays, as in East Texas and sometimes in South Texas. Sometimes fertilizer should be applied in East Texas.

It will be seen that such pastures are meant to stay on the same ground for many years. They are called "permanent pastures" in contrast to sown pastures such as sudan grass, wheat, oats, barley, rye and others which must be plowed and sown every year, called "temporary pastures." Every farm needs some temporary pasture but the need for more permanent pastures is even greater. An investment in such pasture gives returns year after year with little additional labor or expense.

East Texas

With More Than 30-inch Rainfall

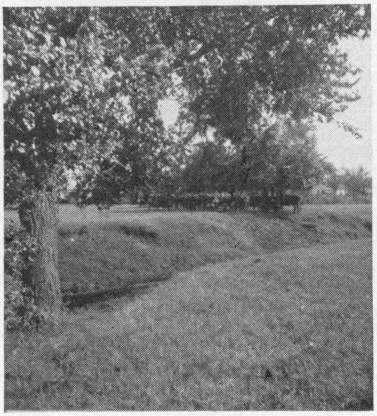
EAST TEXAS LANDS lend themselves more readily to pasture improvement than any others. In the timbered section of East Texas there is still a great deal of land along the creeks and rivers covered by timber and brush that will make excellent pasture after the land has been cleared.

While any improved pasture land in East Texas will produce good grazing, the greatest volume of grazing will come from the most fertile land. Permanent pasture should be located if possible on moist bottom land along creeks and other lowlands and should include the rougher broken land adjoining. In the blackland belt many of the lowlands and the adjoining hillsides now in cultivation would pay better in pasture.

In locating pasture some consideration should be given convenience to the barn and nearness to temporary pasture. The location of barn is not so important for beef cattle as for dairy cattle. If possible the pasture should have trees for shade and plenty of fresh water must be provided.

What's a Good Pasture Worth?

ACCURATE GRAZING RECORDS on 10 of the best pasture demonstrations in East Texas in 1932 showed that a total of 123 acres furnished ample grazing for an average of 257 cows daily, or better than 2 cows per acre. More cattle than this were carried at some periods of the year and less than this at other periods. Little additional feed was required to keep animals in good condition and in good milk flow, in the case of dairy cows.

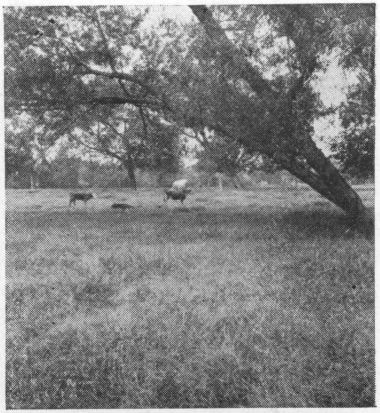


This blackland bottom pasture owned by K. Hunter Bywaters in Lamar county carried an average of 2.84 head of cattle per acre in 1932.

It cost an average of $1.91 per acre in cash to develop these 10 pastures, not counting considerable labor. They were on good land though not entirely on rich bottom land. Everything known to make them good pastures was done, including the removal of all unnecessary timber, brush and stumps; contouring and draining where needed; always mowing at regular intervals to control weeds; and improved grasses and clovers were sown. Every pasture had a good stand of at least three varieties each of grasses and clovers at some time during the year.

This shows what may be expected from the best kind of improved pastures in East Texas, where the rainfall exceeds 30 inches per year. The value of pasture depends on the suitability of the land and the extent of the improvements. For instance, 62 other East Texas pasture demonstrations in 1932 averaged 43 acres per pasture, cost an average of 71 cents in cash per acre to improve, and took almost two acres to pasture an average of one cow the year around.

Unimproved East Texas heavily wooded lands cannot be expected to graze more than one cow to each 25 acres and even then additional feed must be supplied through the winter. Yet 10 woods pasture demonstrations grazed one cow to every 5 acres in 1932 as a result of improvements consisting only of thinning trees and clearing out unnecessary brush. The cash cost of improvement was 21 cents per acre.



An average of 4 cows per acre was carried in 1932 on this lowland pasture developed by Mrs. Cora Strong (owner) and W. A. Bradshaw in Anderson county.

To make a good permanent pasture in East Texas, part or all of these steps are required:

1. Remove all unnecessary timber, brush and stumps.
2. Mow weeds at regular intervals before they seed.
3. Seed to native and improved grasses and clovers when necessary.

This excellent pasture improved by F. M. Watkins in Red River county pastured an average of 1.82 head of cattle per acre in 1932.

4. Provide plenty of fresh water.
5. Contour or terrace when necessary to conserve moisture and prevent erosion.
6. Control rodents.
7. Provide fences and cross-fences to allow alternate grazing.
8. Apply lime where necessary to the growth of legumes.
9. Fertilize with barnyard manure or commercial fertilizer to increase volume of grazing and to supplement mineral needs of livestock.

Goats are often useful in clearing out underbrush as in this Ellis county bottom devoted to pasture and pecans. Goats are also good at keeping sprouts grazed off from roots of deadened trees.

Clear Out Timber and Brush

THERE IS NOTHING more important in the development of permanent pastures than the removal of unnecessary timber, brush and stumps. Such clearing not only gives more good grass land, but it also makes mowing feasible. An occasional tree or clump of trees should be left to furnish shade.

Unnecessary and worthless timber may be killed by girdling the trees with an ax and applying tree poison made as follows: 1 pound of white powdered arsenic, 1 pound of lye and 2 gallons of water. Mix the lye and water first, which will become hot enough when mixed to dissolve the arsenic when added to it. Stir until the arsenic and lye are completely dissolved. Commercial tree poison ready for use may be had from almost any chemical firm.

A coffee pot or some other vessel with a spout should be used to pour the poison in a very small stream around the girdle. When arsenical poisons are used the livestock should be removed from the pasture until rain has had time to wash out the poisonous crystals.

A much slower method of killing timber is to completely girdle the tree with an ax, being certain to cut the inner bark all around. Timber so girdled will sometimes die from the girdle up and leave the stump to sprout out again which makes it necessary to keep sprouts cut off or to graze with goats until the stump dies. This method is not recommended for the more hardy species such as gum, which need **complete** girdling and poison.

Cedar may be killed with tree poison or cut down with an axe. In either case the stump will not sprout.

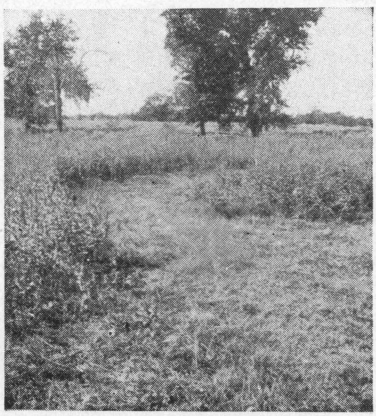
Kerosene oil is being used effectively to kill mesquite in West Texas by spraying the trunks in midsummer from 3 feet above the ground to the roots. It requires about 30 days to kill mesquite with kerosene oil. Experimental work is being carried on now by the Texas Agricultural Experiment Station to determine the best methods of eradicating unnecessary timber and cactus and it may be found that cedar, cactus, and other brush can be killed effectively and economically with kerosene oil.

Keep Weeds Mowed

WEEDS are the chief enemies of good pastures. Keep weeds in control and the good grasses and clovers will thrive. In fact there are few places in East Texas which will not furnish good pasture if this is done. Mowing with a machine or by sheep are the best methods of pasture weed control. Mowing by machine is by far the most common.

In addition to clearing out trees and brush, creek beds should be straightened and the land surface otherwise smoothed in preparation for easy machine mowing.

The first mowing should be made several inches above the ground as otherwise the tops of young plants will be cut off and new seed forms so close to the ground that



Mowing made the difference between good pasture plants and rank weeds in this bottom pasture in which one corner was left uncut except for a circling swath, just to see what would happen. This was the result, months later.

they cannot be cut at a later mowing. To bring weeds completely under control seldom requires more than three mowings the first year, two the second and one the third year. After the third year only occasional weeds will spring up and these can be easily pulled by hand or cut with a hoe to prevent reseeding.

Sow Improved Seed

IN SEEDING pasture grasses and clovers better stands are had on land that has been broken and allowed to settle firmly before it is seeded. Then scratch the surface with a disk harrow (the disks set almost straight). Sow the seed broadcast with or without barnyard manure and use a roller or drag to cover the seed lightly.

When there is sufficient sod of a desirable native grass that should not be destroyed, do not break the ground but scarify it with a spike tooth alfalfa renovator or a disk harrow with the disks set almost straight, or some similar implement in such manner as will not destroy the native sod. The seed can be sown with or without barnyard manure and covered lightly with roller or drag.

On land that cannot be broken or scarified, the seed should be mixed with barnyard manure for sowing.

It always pays to use barnyard manure in sowing pasture seed. In the case of very poor land it is foolish to attempt seeding without it. In seeding with barnyard manure always mix seed and manure together. If plenty of manure is available broadcast the mixture, otherwise place in small piles 6 to 8 feet apart. Spread these piles and chop into the ground to cover the seed lightly.

Cost of seeding is an important item in developing a permanent pasture. A cheap method that sometimes works when money is short is to grow a small seed patch. Pick a small rich piece of ground in the middle of the pasture to be seeded. Manure heavily, sow a heavy application of the seed mixture desired, and fence the patch off from stock. Either harvest the seed by hand and then sow as described before, or take down the fence when seed are mature and let the cattle graze. The seed will be spread in the droppings without serious loss in germination. Sheep digest seed and should not be allowed to graze for the purpose of spreading seed.

Except for lespedeza which should be sown in the spring, all mixtures should be sown the first of September or as soon

thereafter as moisture will permit. If for any reason they cannot be sown by November 15th they should be held back and sown from February 1st to March 15th at which time the lespedeza may be added to the mixture. Do not sow winter grasses and clovers later than March 15th. Lespedeza, bermuda grass, carpet grass and dallis grass may be sown to advantage as late as May 15th.

Pasture Mixtures

Blackland Belt:

Bermuda grass started by means of sod.
10 lbs. Italian rye grass or 5 lbs. Rescuse grass or both.
5 lbs. Dallis grass.
5 lbs. Black Medic.
10 lbs. Bur clover in bur (or 5 lbs. hulled).
10 lbs. Biennial white sweet clover.

Note: On sub-irrigated land White Dutch clover may be added at the rate of 2 lbs. per acre.

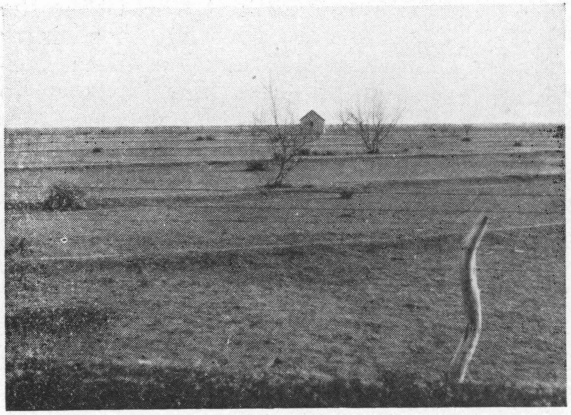
Timbered Section:

Bermuda grass started by means of sod.
10 lbs. Italian rye grass.
5 lbs. Dallis grass.
5 lbs. Carpet grass.
10 lbs. Bur clover in bur (or 5 lbs. hulled).
10 lbs. Lespedeza.
2 lbs. White Dutch clover.
2 lbs. Hop clover.

Gulf Coast Prairie:

Bermuda grass started by means of sod.
10 lbs. Italian rye grass.
5 lbs. Carpet grass.
5 lbs. Dallis grass.
10 lbs. Bur clover in bur (or 5 lbs. hulled).
10 lbs. Lespedeza.
5 lbs. Annual Yellow Sweet clover.
2 lbs. White Dutch clover.
2 lbs. Hop clover.

Note: In cases where all of the varieties are not desired in the mixture, selections should be made with the view of having at least one variety each of grass and clover throughout the year.



This West Texas pasture was one of the first terraced in Texas. East or West, pasture terracing is on the increase.

Close contours as illustrated to the right are easy to throw up and so closely spaced that more rainfall is held.

Terrace or Contour Pasture Land

EXCEPT FOR flat bottom lands that neither wash nor lack for moisture all pasture lands need terracing or contouring. The chief benefit of pasture terraces or contours is the saving of moisture and for this purpose contours as a rule are better and cheaper.

Contours are small level terraces made by throwing up from 2 to 4 furrows with a turning plow. They should be spaced much closer together than terraces, close enough and high enough that the pasture will be reasonably well flooded after rains.

There is little or no erosion on good grass sod, but many old fields and badly washed hillsides need terraces to prevent erosion while the sod is forming. The same is true of new land that is broken in preparation for pasture seeding. Level terraces of regular height and width are recommended. It is usually advisable to plow up contour ridges between the terraces to further hold the moisture for pasture growth.

Drainage is not as important as terracing or contouring but there are many branch bottoms and swampy places that can be much improved for pasture by drainage. Straight sided, deep ditches that will lower the water table are to be preferred to wide, shallow ditches.

Fertilize Where Needed

IT PAYS to fertilize pastures in East Texas, particularly those on poor sandy land. In the timbered section, lime, phosphorous and nitrogen are lacking in the soil and in the Gulf Coast region there is a serious shortage of phosphorous. In areas where the effects of fertilization are not well known, it should first be tried out on a small scale.

On responsive soils, 100 pounds of superphosphate and from 50 to 100 pounds of slowly available forms of nitrogen such as cottonseed meal or cyanamid should be applied in the fall. If quickly available forms of nitrogen such as nitrate of soda or sulphate of ammonia are used, they should be applied as a top dressing in the spring at the rate of 50 to 100 pounds per acre.

Minerals should be added to livestock rations in all regions, especially in the piney woods and Gulf Coast regions. Fertilizers not only increase the growth of grasses and clovers, but also help to supply the mineral deficiencies in feed and pasture.

On acid soils one ton of ground limestone per acre will help supply mineral and improve grasses and clovers.

Barnyard manure is unexcelled as a fertilizer when used freely. As manure accumulates it should be piled under a shed to prevent leaching, or it may be spread out evenly on the soil. Any droppings that have appeared on the pasture should be spread out with a section harrow every now and then so that livestock will graze the pasture evenly.

West Texas

With Less Than 30 Inches Rainfall

WHILE NATIVE GRASSES and forage plants in West Texas resist drouth remarkably well, they are easily damaged by overgrazing. When the stand of valuable plants has been destroyed and replaced with inferior or worthless plants the problem of restoring good grazing is difficult.

Most of the evils of overgrazing may be avoided by adjusting the number and kinds of livestock to suit the seasonal supplies of grass, browse and other forage. It is a good plan to keep grazing in reserve either in separate pasture or by stocking somewhat below the greatest capacity.

Mixed Grazing Profitable

WHILE CATTLE and sheep graze mostly on the same plants, sheep may utilize many weeds that cattle leave untouched, while cattle can better utilize the coarser and more mature grasses. Needle grass which can be utilized by cattle but which can ruin sheep grazing is an example. Goats utilize browse with little competition from either cattle or sheep.

The proportion and number of livestock should vary in different sections with the kinds and amounts of forage. It has been found by the Ranch Experiment Station that in the diversified grazing so highly developed on the Edwards Plateau, 20 cows, 150 ewes and 75 goats per section give efficient use of the range.

Should Seeding Be Tried?

NATIVE GRASSES are ordinarily better adapted than any of the new introductions. Buffalo, gramma and mesquite are unequaled as yet for West Texas. Their seeds, however, are difficult to harvest. Their artificial reseeding is of doubtful value and cannot substitute for good pasture management. The best plan is to save good native sod wherever possible.

If artificial reseeding is attempted, it should be tried only on a small scale and then only where stock can be kept off to give the new plants a chance.

In most sections where native sod is depleted there are possibilities for the introduction of other good grasses. Rye and rescue grass are native to nearly every section as early spring grasses, but Italian rye grass is an improvement over native varieties and may be used even up on the high plains where re-sodding is ordinarily difficult. Crested wheat grass, a new introduction from Siberia is another plant that offers promise in Northwest Texas.

On cultivated or otherwise open land, seeding can be done by first scratching the land with a disk harrow set nearly straight. Sow the seed broadcast at the rate of 20 pounds of Italian rye grass, 10 pounds rescue grass or 10 pounds crested wheat grass, and cover with a section harrow, roller, plank drag or brush.

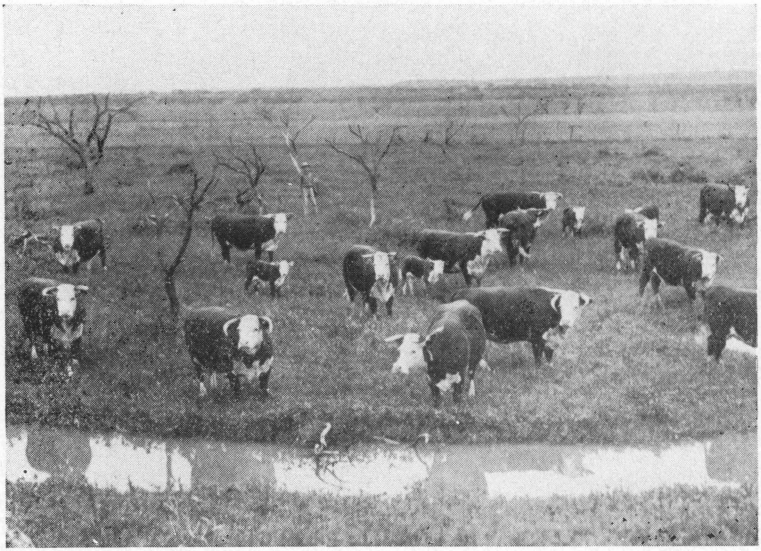
Removing Trees and Brush

NEARLY EVERYWHERE in West Texas something can be done to increase the value of pasture. It will largely be a problem of labor, such as grubbing and clearing timber and brush, digging and piling prickly pear, cutting or mowing weeds, and terracing or contouring to hold moisture.

While mesquite, liveoak and other trees and brush are considered by ranchmen as important forage in emergencies, great areas of West Texas have become so completely covered with these and worthless species that they must be killed to permit the more important forage plants to grow.

Kerosene oil is being used effectively and economically to kill mesquite by thoroughly spraying the trunks of the trees in midsummer from 3 feet above ground to the roots. About 20% of the trees will sprout out from the roots. These sprouts should be covered with a second spraying. Sprouts seldom come twice. It requires about 30 days to kill mesquite with kerosene oil.

Tree poison is used effectively to kill large timber. Poison may be purchased through a drug store or made as follows: 1 pound of white powdered arsenic, 1 pound lye and 2 gallons of water. Mix the lye and water first, which will become sufficiently hot to dissolve the arsenic when added. Girdle the



Mesquite has been effectively killed by spraying with kerosene oil, as on the ranch of F. W. Alexander in Shackelford county.

tree with an ax and from a coffee pot or some other vessel with a spout, pour a small stream of poison around the girdle. When poison is used, livestock should be kept off the pasture long enough that rain will wash out any poison crystals exposed.

If clearing is done with an ax it will be found necessary to keep sprouts cut down or to graze to goats except in the case of cedar which does not come again from the roots.

For prickly pear, arsenic pentoxide mixed at the rate of 3 pounds of poison to 1 gallon of water is giving satisfactory results when applied thoroughly either as a spray or with a stabber during the summer months. When used as a spray the addition of 20% of sulphuric acid seems to get better results. When stabber is used injections should be made near the roots and along the branches. Other poisons are offering considerable promise.

Control Weeds

IN WEST TEXAS desirable weeds are considered an important part of the browse especially where sheep are kept for mixed grazing. Where weeds have become so dense that grasses are smothered out, or where poisonous species have come as a result of over-grazing, they can be controlled with a mower as described for "East Texas."

If the increased grazing will not justify the use of a mower, weeds may be controlled by stocking heavily with sheep when the weeds are young and tender and removing the sheep as the weeds are cleared up so that the grass will grow.

On areas where sheep are not kept for mixed grazing, only enough sheep should be used to keep weeds under control.

Contour or Build Level Terraces

CONTOURS or small level terraces are being used very effectively to conserve moisture with which to grow grasses in West Texas. In fact, seeding grasses and clovers can be extended further west by the use of contours properly constructed. These contours which can be built by throwing 2 to 4 furrows together, should be spaced close enough that the ground will be flooded between them after heavy rains.

South Texas

South of a line drawn East and West through San Antonio

SOUTH TEXAS varies from a moist to a very dry climate. That portion with more than 30 inches rainfall takes the recommendations for the Gulf Coast or the Blackland region described under "East Texas". Where there is less than 30 inches rainfall, recommendations for "West Texas" will apply.

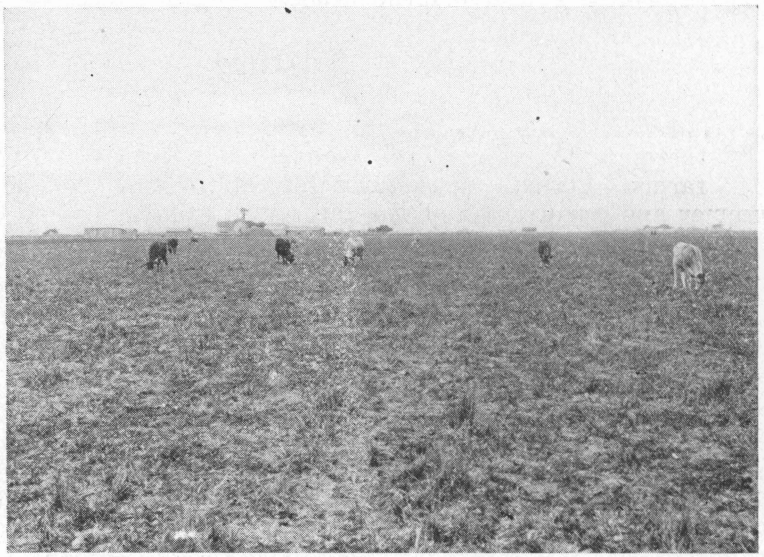
Rhodes Grass a Big South Texas Asset

WET OR DRY, most of South Texas is well adapted to Rhodes grass which is one of the best pasture plants to be found anywhere. Rhodes grass is a native of South Africa and was first grown under domestic conditions at Cape Colony by Cecil Rhodes. The first importation of seed to the United States was made in 1902. The first importation of seed for general distribution was made from Australia in 1912.

There is a large acreage of this grass in Kleberg and Jim Wells counties and farmers and ranchmen are planting more. Rhodes grass will carry a cow to one to three acres compared to one cow to 10 to 30 acres on native range.

Rhodes grass is not easy to start but it is well worth the effort. The seeds are low in germination and the young plants weak. Too much stress cannot be placed on the preparation of the seed bed. The land should be well broken in the fall so that it will have plenty of time to firm before spring planting. It should be disk harrowed and rolled, or a plank drag should be used until the surface is absolutely smooth and free from clods.

Seeding may be done any time during the spring, summer or fall but the best results are obtained by sowing in the early spring from March to April. The usual method is to broadcast 10 pounds of the seed per acre, and cover the same lightly with a section harrow or plank drag. On account of the high cost of seed, the seeding may also be done by drilling 4 pounds



Rhodes grass affords a great opportunity for South Texans to improve their pastures. Ordinarily the grass is much more luxuriant than this, which had withstood a February freeze only two months before the picture was taken. This is the pasture of F. W. Hackfeld, Jim Wells county.

per acre in 36-inch rows. When seeded in this manner the runners will usually fill the middles before the season is far advanced. Another method is to drill three pounds of seed per acre between six-foot corn or grain sorghum rows, with little loss in yields of either corn or grain sorghum. When sown this last way, two years is required for the sod to cover the ground. By the other methods a sod should be formed in about one year. Careful management is required, especially in its early stages, to avoid overgrazing and tramping out with livestock.

Very good results are being obtained by planting home grown seed. As yet no machinery has been discovered that will harvest Rhodes grass seed efficiently. Seed must be harvested by hand or saved from hay. The seed are allowed to mature before the hay is cut, or the seed clipped by hand. When the seed are cut by hand they should be spread out on a barn floor or wagon sheet and placed out in the open to dry thoroughly. When they are thoroughly dry, thresh with a stick and pour over hail screen to separate the chaff from the seed. If the hay is cut, throw loosely on a barn floor. In feeding, the rack should be placed over a trough covered with hail screen. The seed from the barn floor and from the trough may be cleaned as in the former case.

Temporary Pasture

NO MATTER HOW GOOD the permanent pasture may be, there is always need for temporary pasture on Texas farms. Permanent pastures tend to be short in midsummer and during part of the fall and winter. Temporary pastures can be made to fill in most of these gaps, thereby keeping a supply of good pasture almost the year around and also preventing over-grazing of the permanent pasture.

Seed Mixtures Suggested

Combination No. 1.

On any land in Texas with sufficient moisture to germinate, sow small grain at usual rate for grazing or 20 pounds Italian rye grass, broadcast, September 1st, or as soon thereafter as moisture will permit.

From May 1 to June 1, or as soon as grass or small grain has died down, sow 10 pounds of sudan grass in 36 inch rows and cultivate.

Sudan grass has no rival for temporary pastures in Texas.

Combination No. 2.

On Blacklands of Central Texas, sow small grain at the usual rate for grazing or 20 pounds of Italian rye grass mixed with 10 pounds biennial white sweet clover or 15 pounds hairy vetch September 1st, or as soon thereafter as moisture permits. If hairy vetch is used instead of the sweet clover, 10 pounds of sudan in 36-inch rows should follow May 1st to June 1st, or as soon as small grain and vetch have died down.

Combination No. 3.

On Blacklands of Central Texas, sow 4 pounds biennial white sweet clover in 72-inch rows, September 1st, or as soon thereafter as moisture will permit, and cultivate. Between sweet clover rows, from May 1 to June 1, sow 5 pounds sudan grass and cultivate.

Combination No. 4.

On sandy lands of East Texas, sow small grain or 20 pounds Italian rye grass, broadcast, September 1st or as soon thereafter as moisture will permit. From February 15 to

April 1, sow 20 pounds of lespedeza broadcast and cover with section harrow in such manner as not to injure the small grain or rye grass.

Combination No. 5.

On sandy lands of East Texas, sow small grain at the usual rate for grazing or 20 pounds of Italian rye grass and 15 pounds of inoculated hairy vetch seed broadcast. After the grain and vetch have been grazed off closely, sow 20 pounds of lespedeza broadcast, and cover the seed as per Combination No. 4. or sow 10 pounds of sudan in 36-inch rows and cultivate.

Alfalfa for Grazing

ALFALFA is unexcelled as a grazing and hay crop except in the timbered section of East Texas and even there it can be grown on well drained, fertile, bottom lands with an application of two tons of ground limestone per acre. There is a place on many Texas farms for this crop which can be grazed when needed and cut for hay when other pasture is plentiful. For more information about alfalfa see Extension Circular C-92 entitled "Alfalfa in Texas".

Trial plantings of the new crop lespedeza sericea indicate that four pounds of seed per acre, planted in 36-inch rows and cultivated, is better adapted to the timbered section of East Texas, than is alfalfa.

Pasture Grasses and Clovers Desirable

Italian rye grass is imported mainly from Europe. Some seed is produced at present in the Pacific Northwest, where it is used as a hay crop. Although Italian rye grass was introduced into Texas as a winter lawn grass, it is becoming more and more important as a winter pasture, cover, and hay crop. It grows almost anywhere in Texas that moisture permits. It comes from the seed readily, produces turf quickly and furnishes grazing from about December to May 15. Italian rye grass is not so apt to winter kill as is small grain and has the ability to reseed itself under grazing conditions where it is not grazed too heavily during the seeding period.

Rescue grass is native to Central, South and West Texas and grows to advantage in permanent pastures when planted on the stronger lime lands of East Texas. It is resistant to cold, has the ability to reseed it-

Brief Information About Pasture Plants

Name of Plant	Time of Seeding	Rate of Seeding	Method of Seeding	Period of Grazing	Where Adapted	Analysis of Grasses and Clovers Dry		
						Protein	Nitrogen Free Ex.	Fat
Italian Rye Grass	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	20lb tem. pasture 10lb permanent pasture mixture	Broadcast on broken land or on scarified sod.	November to June	All Texas where the moisture is sufficient.	8.1	43.3	1.9
Rescue Grass	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	5lb permanent pasture mixture	Broadcast on firm, broken land or scarified sod.	November to May	Black lands and South and West Texas.	9.8	44.5	3.2
Crested Wheat Grass	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	10lb per acre	In 36-in. rows	All the Year	Northwest Texas	7.2	46.2	2.3
Bermuda Grass	Feb. 15 to Nov. 1	5-10lb per acre	Sod in rows or seeded broadcast on broken land.	March to Frost	All Texas except extremely cold or arid regions.	7.1	48.2	1.8
Carpet Grass	Feb. to June	5lb per acre	In permanent pasture mixtures on broken land or scarified sod.	March to Frost	Sandy drouth resistant soils of East Texas and Gulf Coast Prairie.	7.0	40.9	2.2
Dallis Grass	Sept. 1 to Nov. 15 or Feb. 1st to June	5lb per acre	In permanent pasture mixtures on broken land or scarified sod.	March to Frost	All Texas with more than 30-in. rainfall.	8.7	32.1	1.8
Sudan Grass	March to August	10lb per acre	In 36-in. rows or between 72-in. clover rows and cultivate.	From May to Frost	All Texas where the moisture is sufficient. Very drouth resistant.	8.2	44.7	1.6
Rhodes Grass	March to May	10lb per acre 2lb in 36-in. rows	Well prepared seed bed, broadcast or in rows.	All the Year	South of East and West line through San Antonio.	5.6	43.1	1.3
Bur Clover	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	10lb in the bur or 5lb cleaned	Broadcast in permanent pasture mixtures on broken land or scarified sod.	Nov. 15 to May 15	East of 25-in. rainfall line, except poor sands of East Texas.	19.2	37.0	3.9

Name of Plant	Time of Seeding	Rate of Seeding	Method of Seeding	Period of Grazing	Where Adapted	Analysis of Grasses and Clovers Dry		
						Protein	Nitrogen Free Ex.	Fat
Black Medic	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	5lb per acre	Broadcast in permanent pasture mixtures on broken land or scarified sod.	Nov. 15 to July	East of 25-in. rainfall line on lime soils.	16.9	43.2	3.0
Lespedeza	Feb. 1 to June	20lb alone or in small grain 10lb in permanent pas. mix	Broadcast in small grain or on broken land or scarified sod.	April to Frost	Sandy lands of East Texas and Gulf Coast Prairie.	12.1	41.6	2.8
Lespedeza Sericia	Feb. 1 to June	10lb in 36-in. row	In 36-in. rows and cultivated.	April to Frost	Sandy lands of East Texas — other areas not known.	No	Analysis	
White Dutch Clover	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	2-5lb per acre in mixtures	Broadcast in permanent pasture mixtures on broken land or scarified sod.	From November to August	Moist sandy lands of East Texas and Gulf Coast Prairie.	16.2	41.6	2.9
Hop Clover	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	2-5lb per acre in mixtures	Broadcast in permanent pasture mixtures on broken land or scarified sod.	February to June	Sandy lands of East Texas and Gulf Coast Prairie.	No	Analysis	
Carolina Clover	Seeds naturally			February to May 15th	Sandy lands of East Texas.	No	Analysis	
Annual Yellow Sweet Clover	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	20lb alone, 10lb in mixture, 4lb in 36-in. rows	Alone or in small grain or in per. pasture mixtures or in rows.	November to June	South and Southeast Texas.	13.4	31.5	1.6
Biennial Sweet: (Yellow and White)	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 15	20lb alone, 10lb in mixture, 4lb in 36-in. rows	Alone or in small grain or in per. pas. mixtures or in rows.	All the year after first of year	Lime soils of Texas where moisture is sufficient.	14.5	40.1	2.2
Alfalfa	Sept. 1 to Nov. 15 or Feb. 1 to Mar. 1	12lb per acre 3lb in rows	Well prepared seed bed broadcast or in rows.	At intervals throughout the year	On all well drained lime soils with sufficient moisture.	14.9	37.3	2.3

self under grazing conditions and furnishes grazing from about November to April 15. While rescue grass is a very good winter grazing crop, it has not been planted very extensively on account of the high cost of seed.

Crested wheat grass is a long lived perennial bunch grass introduced from Russia. It is more palatable than our native brome grasses and has a much longer growing season. It is especially adapted to severe cold and drouth. Although it has not been tried in Northwest Texas, it offers some promise as a hay and pasture crop and should be tried at first on a small scale. For further information, write U.S.D.A. Washington, D. C. for Technical Bulletin No. 307.

Bermuda grass is well adapted to the entire eastern half of Texas, and should form the basis of practically all permanent pastures in this territory. The only places where it does not thrive are poorly drained or water-logged soils and very light poor sandy soils.

A good method of starting bermuda grass is to open shallow furrows three feet apart and drop small pieces of sod in the furrows at intervals of three feet. These pieces can be pressed into the soil by stepping on them or they may be covered lightly with soil by means of a hoe or small plow. Another method consists of flat breaking the land, broadcasting the pieces of sod over the field and disking them into the soil with a disk harrow. Good stands were recently reported as coming from seed produced in Arizona. When seed are used sow from 5 to 10 pounds per acre.

Carpet grass is an excellent pasture grass for low, moist places particularly on bottom lands in the timbered section and in the Gulf Coast Prairies. Wherever it is adapted and grazed closely it will often crowd out other vegetation, even bermuda grass. This grass cannot stand much shade and hence the land must be kept clear of brush and weeds. In most cases where this grass is adapted it will come to a good stand without sowing additional seed.

Dallis grass, a perennial plant, although still rather new in Texas, promises to play an important part in our permanent pastures. It will grow on practically all soils getting 30 inches or more rainfall per year, except on very sandy poor soils, but is best adapted to the heavier, moist bottom lands. This grass comes out earlier in the spring than does bermuda grass and remains green until late in the fall. Dallis grass is often slow in coming up due to delayed germination. It has been found that seed sown in September of one year may not germinate until October of the following year. Australian seed, although higher in price, is reported to produce better stands.

Bur Clover has proved to be one of the best winter and early spring pasture plants for cattle over a large section of Texas, especially in the Blackland Belt, Gulf Coast Prairie and timbered sections of East Texas, on the well drained and better types of soil. It is not recommended for sheep pasture because the burs get into the wool. Black medic is a good substitute where sheep are grazed.

There are several kinds of bur clover, the Southern Spotted, California, and other. All are well adapted to conditions prevailing in the eastern half of the state. There is very little to choose between them except that the Southern Spotted bur clover is somewhat more hardy than the California and may be better adapted to the northern section of the state. Medicago minema, a species found growing in West Central Texas, seems to be better adapted to that section.

For sowing bur clover alone, use 1 to 2 bushels of seed while still in the bur or 10 pounds of hulled. It is not necessary to inoculate the seed if burs are used but the hulled seed should be inoculated with culture which may be obtained from seed houses. The seed or the pasture may also be inoculated with soil from pastures or fields where bur clover, sweet clover, or alfalfa is growing or has recently grown.

Black medic is a winter clover well adapted to the Blackland Belt where the land is rich in lime, and to the Gulf Coast Prairie, provided the land is not acid. It furnishes winter and spring grazing similar to bur clover, but lasts longer because it comes earlier and seeds later in the spring than bur clover. It is better adapted for sheep than bur clover, because it has no burs to stick in the wool.

Lespedeza, a legume which is known also as "Japan Clover," is a spring and summer growing plant, well adapted to the timbered section of East Texas and to the Gulf Coast Prairie. In these sections it is found wild in many places. Lespedeza makes a good combination with bermuda grass. However, it is not adapted to the Blackland Belts of Central and North Texas, except in moist places. Kobe, Korean, and Tennessee 76 are improved strains of lespedeza and may be substituted for the native variety when they are known to do better. These varieties should not be substituted for native lespedeza except where they have been tried and it is known that they will reseed themselves over a reasonably long period of time, say at least three years.

Lespedeza sericea is a perennial lespedeza coming each year from crowns. The number and size of stems increase from year to year, depending on the thickness of the stand. Although cattle relish it, there is no information as to how much grazing it will stand or what gains are to be expected from its use. It may be grazed from April to late fall.

When used for a hay crop, it should be cut at about the same stage of growth as alfalfa. It should be planted at the rate of 2 pounds of

cleaned, or 5 pounds of unhulled seed per acre in 36-inch rows and cultivated. Lespedeza sericea is not recommended where alfalfa will grow profitably.

White Dutch clover grows wild over a large section of East Texas. It is a perennial and is well adapted to the fertile lowlands for early spring and late fall grazing.

Hop clover is an annual clover resembling lespedeza. It is well adapted to East Texas, especially the Northeast part. It furnishes very early spring grazing and seeds the latter part of April and early part of May. Hop clover fits in well with bermuda grass and lespedeza and should be included at the rate of two pounds per acre in permanent pasture mixtures.

Carolina clover is a very small and very early spring clover and seems to be native to all East Texas. Although it is small and furnishes grazing over a short period, it is a soil builder destined to be of great assistance in the development of permanent pasture in East Texas. Where adapted, Carolina clover comes naturally when cultivation ceases and need not be seeded.

Sweet clover is a good temporary pasture crop either grown alone or in a crop rotation. It provides much grazing and builds up soil fertility. It is also good in permanent pasture mixtures in the Blackland Belt and Gulf Coast Prairie. In the Blackland Belt the biennial white sweet clover is the most satisfactory, but in the Gulf Coast Prairie and the timbered sections of East Texas the annual yellow blooming sweet clover is better adapted. The latter can stand more acidity in the soil than can the former. The seed should be inoculated unless bur clover, alfalfa or sweet clover have been previously grown on the land. Scarified seed germinate best.

Sudan grass has no equal for temporary summer pasture in Texas, and every farmer should plant some every year. Sudan grass does better planted at the rate of 10 pounds of seed per acre in 36-inch rows and cultivated. In East Texas it should be fertilized with commercial fertilizer or barnyard manure, as one would corn.

Sudan grass should not be grazed until the plants are from 15 to 18 inches high. If it matures too much before it can be grazed, or becomes stemmy after grazing, the grass should be mowed off with a mower and saved for hay; then allowed to stand for a few days so that new succulent shoots can come.

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